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Vanakripa chinensis sp. nov. from China and notes on the genus

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ABSTRACT—A new species *Vanakripa chinensis* found on decaying branches of an unidentified tree is described and illustrated. It is characterized by sporodochial conidiomata composed of macronematous, cylindrical conidiophores that are sometimes reduced to conidiogenous cells and obovoid, unicellular, brown, smooth conidia with a black spot near the middle. Notes on conidiogenous events in the genus *Vanakripa* and a key to the species are provided.

KEY WORDS—asexual fungi, hyphomycetes, taxonomy

Introduction

Vanakripa, was introduced by Bhat & al. (Bhat & Kendrick 1993) with *V. gigaspora* as type species; it is distinguished by scattered, punctiform, pulvinate to postulate black or dark brown loosely or compact sporodochial conidiomata. The conidiophores are macronematous, mononematous, cylindrical below and inflated toward the apex, erect, flexuous, un- or slightly branched, refractively septate, smooth, and hyaline. The conidiogenous cells are monoblastic, cylindrical to narrowly or broadly clavate, truncated after conidial secession, terminal, integrated, hyaline (sometimes with a refractive lumen), and smooth. Conidia are solitary, acrogenous, variably shaped (clavate, broadly pyriform, obovoid, ellipsoidal), truncate at the base and rounded at the apex, 0–1-septate, darkly pigmented, smooth, thick walled, usually remaining attached to the conidiogenous cells (Bhat & Kendrick 1993). Under the predominantly subtropical climate of Yunnan province, several novel asexual fungi have been found in the rainforest and mountains by Guo & al. (2019), Zhang & al. (2020), and Zheng & al. (2019, 2020a,b). During a survey of fungal diversity in Xishuangbanna, Yunnan province, an interesting fungus was collected on decaying branches; its conidiomata, conidiogenesis, and conidial features clearly suggest a placement in the genus *Vanakripa*.

Materials & methods

Samples of decaying plants in plastic were bags placed and transported to the laboratory, placed in moist chambers, and treated according to Castañeda-Ruiz & al. (2016). Mounts were prepared in lactic acid (90%) or in polyvinyl alcohol-glycerol (8 g PVA in 100 mL of water + 5 mL of glycerol). Microscopic characters were measured at ×1000 using a Nikon Eclipse Ni-U microscope with DIC optics and a Nikon DS-Fi2 camera. The holotype was deposited in the Herbarium of Department of Plant Pathology, Shandong Agricultural University, China (HSAUP).

Taxonomy

Vanakripa chinensis K. Zhang, W.H. Guo, R.F. Castañeda & D.W. Li, **sp. nov.** FIG. 1

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Differs from *Vanakripa fasciata* by its narrow obovoid, smaller conidia; and from *V. rhizophorae* by its smaller, uniformly obovoid, dark spotted conidia.

TYPE: China. Xishuangbanna Tropical Botanical Garden, on decaying branches of an unidentified broadleaf tree, 22 July 2019, coll. K. Zhang & W.H. Guo (**Holotype**, HSAUP Y190114).

ETYMOLOGY: Latin, *chinensis,* referred to the country of collection, China.

COLONIES on the natural substrate effuse, black. CONIDIOMATA sporodochial, scattered, punctiform, pulvinate or pustuliform, ≤250 µm diam. MYCELIUM superficial and immersed, composed of septate, branched, hyaline, smooth-walled hyphae. CONIDIOPHORES macronematous, mononematous, erect, straight or flexuous, 0–2-septate, sometimes refractive at the septa, smooth-walled, hyaline, ≤35 µm length, sometimes reduced to conidiogenous cells. CONIDIOGENOUS CELLS monoblastic, cylindrical, sometimes narrowly clavate lumen refractive or translucent, determinate, integrated, terminal, smooth, hyaline, 15–29 × 2.5–5 µm. CONIDIAL SECESSION schizolytic. CONIDIA solitary,

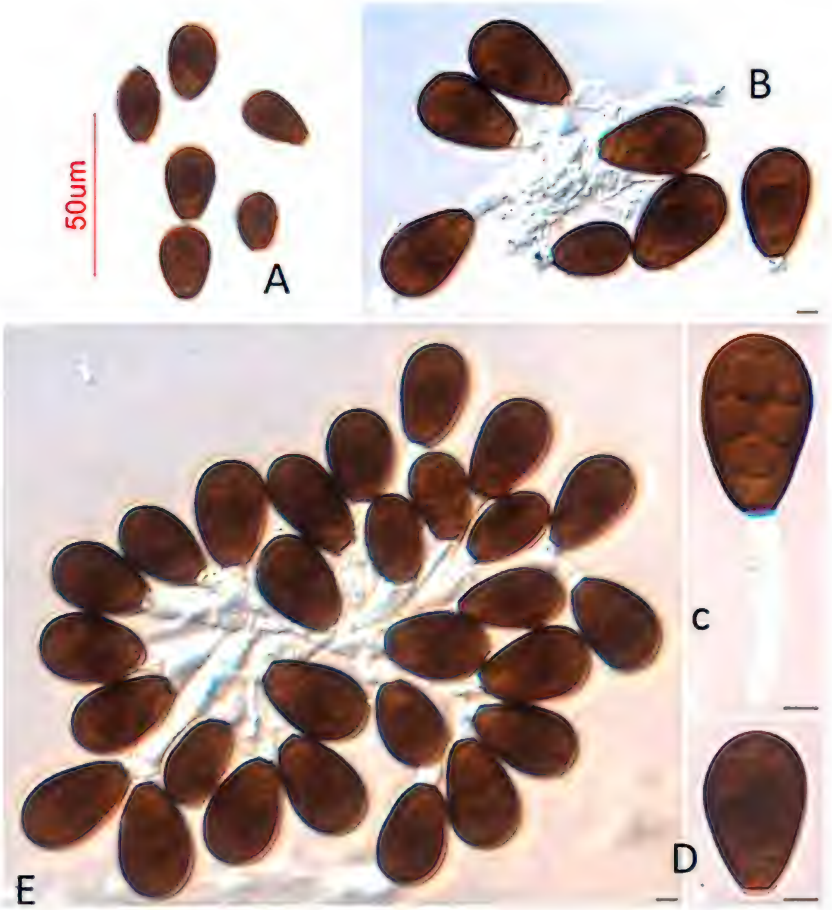

Fig. 1. *Vanakripa chinensis* (holotype, HSAUP Y190114). A. Conidia after schizolytic secession; B. Detached and attached conidia and conidiogenous cells; C. Conidiogenous cell with attached conidium; D. Conidium after schizolytic secession; E. Sporodochium. Scale bars: B–E = 5 µm.

acrogenous, obovoid to broad obovoid, truncate at the base, unicellular, thick-walled, guttulate, 19.8–22.8 × 12.7–14.8 µm, smooth, brown to black, with a conspicuous or inconspicuous black spot near the middle.

Notes: *Vanakripa* now comprises nine accepted species (Index Fungorum 2020; this paper): *V. chinensis*, *V. fasciata* R.F. Castañeda & al., *V. gigaspora* Bhat & al., *V. inexpectata* S.M. Leão & Gusmão, *V. inflata* (Hol.-Jech.) Melnik, *V. menglensis* D.M. Hu & al., *V. minutiellipsoidea* Pinnoi, *V. parva* Bhat & al., and *V. rhizophorae* R.M. Arias & al. (Arias-Mota & al. 2008, Bhat & Kendrick 1993, Castañeda-Ruiz & al. 2005, Hu & al. 2010, Leão-Ferreira & al. 2013, Mel'nik 2011, Pinone & al. 2003). Additionally there is an invalid species, "*V. ellipsoidea*" K.M. Tsui & al. (Tsui & al. 2003), which lacks a designated holotype. *Vanakripa chinensis* superficially resembles *V. fasciata* in the dark spotted conidia, but *V. fasciata* has bigger (24–34 × 16–23 µm) ellipsoidal conidia that are dark brown with a black transverse band at the centre. Also somewhat similar to *V. sinensis, V. rhizophorae* is distinguished by its brown to black, variably shaped (globose, ovoid to ellipsoidal; 16.6–22.3 × 6.3–14.7 µm) conidia.

Key to *Vanakripa* species

1. Conidia one-celled 3
1. Conidia with a submedian septum 2

2. Conidia ellipsoidal or obovoid, 17–27 × 7–12 µm, smooth, asymmetric, apical cells large, brown to dark brown, basal cells small, pale brown .... *V. inexpectata*
2. Conidia clavate, obovoid to obpyriform, 32–43 × 18–22 µm, smooth, asymmetric, apical cells large, 30-38 µm long, dark brown to black, basal cell small, 3-5 µm long, pale brown .... *V. gigaspora*

3. Conidia mostly ovoid, obovoid, or fusiform, truncate at the base 4
3. Conidia not primarily ovoid, obovoid, or fusiform 5

4. Conidia obovoid, larger (19.8–22.8 × 12.7–14.8 µm), guttulate, brown to black, with a conspicuous or inconspicuous black spot near the middle, smooth .... *V. chinensis*
4. Conidia ovoid or fusiform, smaller (7–10 × 4–6 µm), brown to dark brown .... *V. parva*

5. Conidia mostly ellipsoidal 6
5. Conidia mostly clavate or globose 8

6. Conidia fasciate, ellipsoidal, 24–34 × 16–23 µm, brown to dark brown, with a black transverse band at the centre, smooth-walled .... *V. fasciata*
6. Conidia not fasciate 7

7. Conidia ellipsoidal, 25–33 × 16–23 µm, with rounded apex and base, dark brown to black, smooth-walled .... *V. minutiellipsoidea*
7. Conidia broadly ellipsoidal to subspherical, 14.5–24 × 9.5–19.5 µm, truncate at the base, dark brown, smooth-walled; conidiogenous cell 27–48 × 8–14 µm .... *V. inflata*

8. Conidia clavate to obpyriform, truncate at the base, (8–)17–23 × 8–13 µm, brown to dark brown, smooth; conidiogenous cells 20–40 × 4–6 µm .... *V. menglensis*
8. Conidia globose, obovoid to ellipsoidal, 17–22 × 6.3–14.7 µm, dark brown to black, smooth; conidiogenous cells 29.4–54 × 4–9.3 µm .... *V. rhizophorae*

Discussion

Bhat & Kendrick (1993) described *Vanakripa* as having "conidiogenous cells [that are] holoblastic, obpyriform, clavate, colorless, often curved, narrowed toward the base, truncate after conidial secession" and "conidia [that are] clavate to obpyriform, rounded at the tip, truncate at the base, darkly pigmented, smooth, 0–1-septate." Obviously, the conidial secession of *Vanakripa* is schizolytic, and only after this event, both conidiogenous cells and conidia have flat or truncate scars at the cell apex and conidial base. A conidiogenous cell is defined as any cell from or within which a conidium is directly produced, and a locus is the place on the conidiogenous cell where a conidium arises (Kendrick 1971, Kirk & al. 2008). In *Vanakripa* mature conidia usually remain attached on the conidiogenous loci, and after mechanical disturbance the conidiogenous cells and conidia separate by rhexolytic secession from the conidiophores. However, conidia that have been captured from the surface of substrate or released from the conidiogenous cells in a drop of KOH 4% show a flat, truncate base without any portion or frill of the conidiogenous cells (Fig. 1A). Bhat & Kendrick (1993), Holubová-Jechová (1983), Leão-Ferreira & al. (2013), Hu & al. (2010), and Seifert & al. (2011), have illustrated similar flat, basal truncated conidia. Hughes (1951) discussed Penzig's illustration of *Beltrania rhombica* Penz., with special reference to the attached intermediate cell found between conidiogenous cell and conidia that Penzig called "stermmi" to be later renamed a "separating cell" by Hughes (1951) and also adopted by Pirozynski (1963) in his taxonomical studies of *Beltrania*, *Beltraniella*, *Beltraniopsis*, and *Ellisiopsis.* In the strict sense, a separating cell is a cell between a conidium and a conidiogenous cell (Kirk & al. 2008); but the term is also applicable to the conidium, at first attached to the conidiogenous cell, then separating by schizolytic or rhexolytic secession. In *Vanakripa* the conidiogenous cells are monoblastic, terminal, integrated, cylindrical, vermiform, long clavate, usually slightly or strongly inflated near the conidiogenous locus and the conidia are produced on the apical locus, but not separating cell, which exists between the conidiogenous cells and conidia (Bhat & Kendrick 1993). However, separating cells associated with rhexolytic and schizolytic conidial secession have also been reported and illustrated in *Pseudotrichoconis*, *Rhexodenticula*, and *Dictyoaquaphila* (Baker & al. 2001, Li & al. 2011, Arias-Mota & al. 2016, Monteiro & al. 2016).

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